Message

From: Greger, Robert@CDPH [Robert.Greger@cdph.ca.gov]
Sent: 10/25/2021 10:10:10 PM
To: Greger, Robert@CDPH [Robert.Greger@cdph.ca.gov]
Subject: RE: Response to CDPH request - Dangerous Radiation Exposures Hunters Point Naval Shipyard - a Federal Superfund Site

From: Greger, Robert@CDPH
Sent: Monday, August 10, 2020 2:28 PM
To: Ahimsa Porter Sumchai MD NSCA-CPT Ex. 6 Personal Privacy (PP)
Cc: Gonzalo.Perez@cdph.ca.gov; Fassell, John@CDPH <John.Fassell@cdph.ca.gov>; Sanchez, Yolanda <Sanchez.Yolanda@epa.gov>
Subject: FW: Response to CDPH request - Dangerous Radiation Exposures Hunters Point Naval Shipyard - a Federal Superfund Site

Dr. Sumchai

Thank you for your July 25 and 28, 2020 responses.

I've completed a partial review of your concerns over the presence of radioactive materials detected in urine samples of individuals working or living on or nearby the Hunters Point Naval Shipyard (HPNS), including your July 28, 2020 email that referenced "dangerous ongoing radiation exposures that are emanating from the naval base" and your finding of "locations around the base where urine toxicology screenings have detected two specific radiation clusters". One of those clusters involves Building 830/831 workers, which is of principal interest to me inasmuch as I had previously indicated that my organization's current regulatory interest is limited to radioactive materials related to the UCSF property (Buildings 830/831); however, my comments in this email should apply to radioactive materials more broadly at HPNS. You named nine specific elements that concern you (vanadium, manganese, arsenic, rubidium, strontium, cesium, gadolinium, thallium, and uranium) based on the Genova Diagnostics' mass spectroscopy testing of urine samples provided by the workers and residents. Below is my assessment of the significance of the Genova Diagnostics urine testing in general and with respect to the nine elements you identified.

According to Genova Diagnostics personnel, Genova Diagnostics bases its quantification of 33 of the 35 elements in its Urine Comprehensive Element Profile (UCEP) reports on stable (i.e. non-radioactive) isotopes of the elements in submitted urine samples. The remaining two elements (thorium and uranium) have no stable isotopes, and those elements are quantified in the UCEP reports based on their long-lived, naturally-occurring radioactive isotopes Th-232 and U-238. There are naturally-occurring radioactive isotopes of some of the 35 elements in the Genova Diagnostics UCEP reports, and there are artificially-created radioactive isotopes of all of the 35 elements. There are far more artificially-created radioactive isotopes than naturally-occurring radioactive isotopes of the 35 elements identified in the UCEP reports; however, most of the artificially-created radioactive isotopes have no practical use, typically because their half-lives are too short.

Naturally-occurring radioactive isotopes will be present in urine samples (and therefore in the urine providers' bodies) if the stable isotope of the element is present in the urine samples. Of the eight elements you identified that are quantified based on stable isotopes, only three have naturally-occurring radioactive isotopes; vanadium (V-50), rubidium (Rb-87), and gadolinium (Gd-152). These three naturally-occurring radioactive isotopes will always be present if the stable isotope of the element is present because they are present in the ores with the stable isotopes and react chemically exactly like their corresponding stable element. Two of the three naturally-occurring radioactive isotopes, V-50 and Gd-152, are not considered significant radiation dose contributors to humans due to their small natural

abundances (0.25% for V-50 and 0.20% for Gd-152) and their low specific activities due to their very long half-lives (1.4E17 years for V-50 and 1.1E14 years for Gd-152). The third naturally occurring radioactive isotope, Rb-87, contributes approximately 0.6 mrem annually to human radiation doses from normal intakes of rubidium, primarily from dietary sources [Eisenbud/UNSCEAR 1988]. This 0.6 mrem is a very small portion of the average annual dose of approximately 311 mrems to humans from natural background radiation in the U.S. Elevated stable rubidium isotope levels in urine would mean the Rb-87 levels, and therefore the dose from Rb-87, would be proportionately increased; however, this additional Rb-87 dose could only be attributable to HPNS if it is determined that HPNS is the source of the elevated stable rubidium in the urine samples. One would typically make this determination based on soil and air/dust sampling and knowledge of dietary intakes (food, water, supplements) by the individuals providing the urine samples. Do you know if such soil and air/dust sampling has been conducted, or efforts to determine dietary intakes have occurred, and the results obtained?

Unlike the naturally-occurring radioactive isotopes, the presence of artificially-created radioactive isotopes is independent of the presence of stable isotopes of elements; therefore either may be present without the presence of the other, or coincidently they both may be present. This is because artificially-created radioactive isotopes do not appear in natural ores from which the stable form of the element is derived. This is addressed by Genova Diagnostics in the "Commentary" they provide when elevated levels of cesium are found in their analyses of customers' urine submittals. The Genova Diagnostics cesium Commentary states "*This element is known for its radioactive isotopes, which are uranium fission products and arise from nuclear power plant fuel and from atomic bomb testing. It is also known for its medical and research uses (Cs-137, 'Radiogardase-Cs"). ... Measured and reported here is stable (nonradioactive), natural isotope of cesium Cs-133; natural cesium is 100% Cs-133.* ***Elevation of Cs-133 does not imply, and has no relationship to, the presence (or the absence) of radioactive isotopes of cesium***" [bolding added]. This statement regarding cesium is applicable to all of the artificially-created radioactive isotopes of the 33 elements in the Genova Diagnostics UCEPs that are quantified based on stable elements, but does not apply to naturally-occurring radioactive isotopes as noted in the preceding paragraph. If one wants to determine if any artificially-created radioactive isotopes are actually present in the Genova Diagnostics urine samples, one would have to perform isotope-specific radiological analyses, or some other isotope-specific analyses, of the urine samples for the particular artificially-created radioactive isotopes of interest. Do you know if such urine sample analyses have been performed, and the results obtained? <u>If such analyses have not been performed, any claims that artificially-created radioactive isotopes have been identified through the Genova Diagnostics urine testing would be erroneous.</u> Even if the isotope-specific analyses have been performed and did identify the presence of specific artificially-created radioactive isotopes, one would still have to demonstrate the likelihood that they originated at HPNS, although this task would be easier than for naturally-occurring radioactive isotopes inasmuch as the possible origins are more restrictive for the artificially-created radioactive isotopes.

The ninth element that you mentioned as being of concern to you is uranium. Uranium is a naturally occurring radioactive element that exists in soil throughout the U.S. All of the isotopes of uranium are radioactive. In addition to the radioactivity hazards presented by uranium, it is also chemically damaging to the kidneys, particularly when it is present in soluble form. At least one of the UCEPs shows significantly elevated uranium; however, we have found uranium in urine of people within California at higher levels than the highest UCEP reported level at HPNS due to elevated uranium in drinking water. My research regarding uranium levels in non-uranium workers (e.g. HPNS workers and residents) indicates that it is much more likely that the uranium intakes result from food and water intakes than from inhalation of suspended particulates in air [ATSDR]. Have interviews been conducted of the involved workers/residents with elevated uranium findings to determine what they drink and eat, including dietary supplements? Also, soil and air/dust sampling for uranium should substantiate if it is feasible that the elevated uranium in the UCEP reports originated from HPNS. Isotope specific uranium analyses of soil and urine can also be of value to determine whether the uranium is in natural form or enriched in U-235, which also may help in determining its origin. Do you know if such soil and air/dust sampling has been conducted, and the results obtained?

As I indicated initially in this email, my particular interest is in the workers at the UCSF property (Buildings 830/831). I would appreciate if you would send me all the UCEP reports that have been received on those individuals, and others as convenient. I've received a number of UCEP reports from you and others previously, but I'm not sure which ones are specific to workers in Buildings 830/831. The UCEP reports I have, identified by their creatinine concentrations, are:

29.08, 43.38, 56.32, 59.46, 64.55, 96.11, 107.38, 128.73, 138.23, and 195.92. As I've indicated previously, I don't need any personally identifying information.

I have more work to do regarding my investigation, but for now I can definitively say that the UCEP reports by themselves do not provide any information regarding the presence or absence of artificially-created radioactive isotopes (e.g. Mn-54, As-73, Sr-90, Cs-137, and Tl-204) in the urine samples. I can also say that the UCEP reports for four of the nine elements of specific concern to you (vanadium, rubidium, gadolinium, uranium), do provide information that if the elements are identified in urine samples, their respective naturally-occurring radioactive isotopes will exist in the urine samples; however, one cannot definitively conclude that HPNS is the source of these naturally-occurring radioactive isotopes.

Let me know if you have questions.

Respectfully

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